

## A New Variety of *Sinocrassula paoshingensis* (S.H.Fu) H.Ohba & al. (Crassulaceae)

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A new variety of *Sinocrassula paoshingensis*, var. *spinulosa*, is proposed. Variety *spinulosa* is distinguishable from var. *paoshingensis* by its apically serrate leaves. The variety produces nodule-like structures on the roots. The presence of such structures is reported in the Crassulaceae for the first time.

**Key words:** Crassulaceae, flora of China, new variety, *Sinocrassula paoshingensis*, Tibet

The genus *Sinocrassula* (Crassulaceae) is one of the endemic and diversified genera in the Sino-Himalayan region. Because of its succulent nature, like other crassulaceous plants, it is difficult to observe the morphological characteristics from herbarium specimens. The morphological variation has therefore not been well studied until now. Fu (1984) recognized six species in *Sinocrassula*: *S. yunnanensis*, *S. ambigua*, *S. densirosulata*, *S. techinensis*, *S. longistyla* and *S. indica*. Zhuang (1997) reported two additional species, *S. luteorubra* and *S. diversifolia*, however the classification at the species level is still controversial.

*Sinocrassula paoshingensis*, which was described first as *Sedum paoshingense*, on the basis of a single collection from Pao-shing (= Baoxing), Sichuan Province, China (Fu, 1965), is now found at some localities in Sichuan (Garlung and Daocheng Xian) and Yunnan (Deqin Xian) (Ohba et al. 2000).

In 2000, we found a plant resembling *Sinocrassula paoshingensis* near Qamdo [Chamdo] in E. Xizang [Tibet]. The plant has vegetative and floral features that corre-

spond to those of *S. paoshingensis* except for the serrate leaves, which are not easily detached when touched, and the obtuse (not apiculate) apex of the petals. The teeth of the leaves have an acute-spinulose apex. Although our plants share many characteristics with *S. paoshingensis*, because of the differences in the leaves and petals we recognize them as a new variety, which we name var. *spinulosa*. In *Sinocrassula*, *S. indica* (Decne.) Berger var. *serrata* (Raym.-Hamet) S.H.Fu from Sichuan is the only representative having serrate leaves. Our plants differ from var. *serrata* by having glabrous leaves.

Variety *spinulosa* has nodule-like structures on the roots. The nodules are small, usually less than 0.5 mm long and wide, and consist of several outgrowths. The nodules resemble the primordia of roots or root nodules produced by bacteria. The same structure is found in the roots of *S. paoshingensis* var. *paoshingensis* and also in *S. indica*. We need further observations to determine their nature and make clear their detailed structure.

***Sinocrassula paoshingensis*** (S.H.Fu)  
H.Ohba, S.Akiyama & S.K.Wu in J. Jpn.  
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Var. ***spinulosa*** H.Ohba, S.Akiyama &  
S.K.Wu, var. nov. [Figs. 1–3]

A typo (var. *paoshingensis*) foliis prope  
apicem serratis (serris apice acuto spinulosus)  
et petalis apice obtusis nec apiculatis bene  
differt.

Perennial glabrous herbs with rosettes.

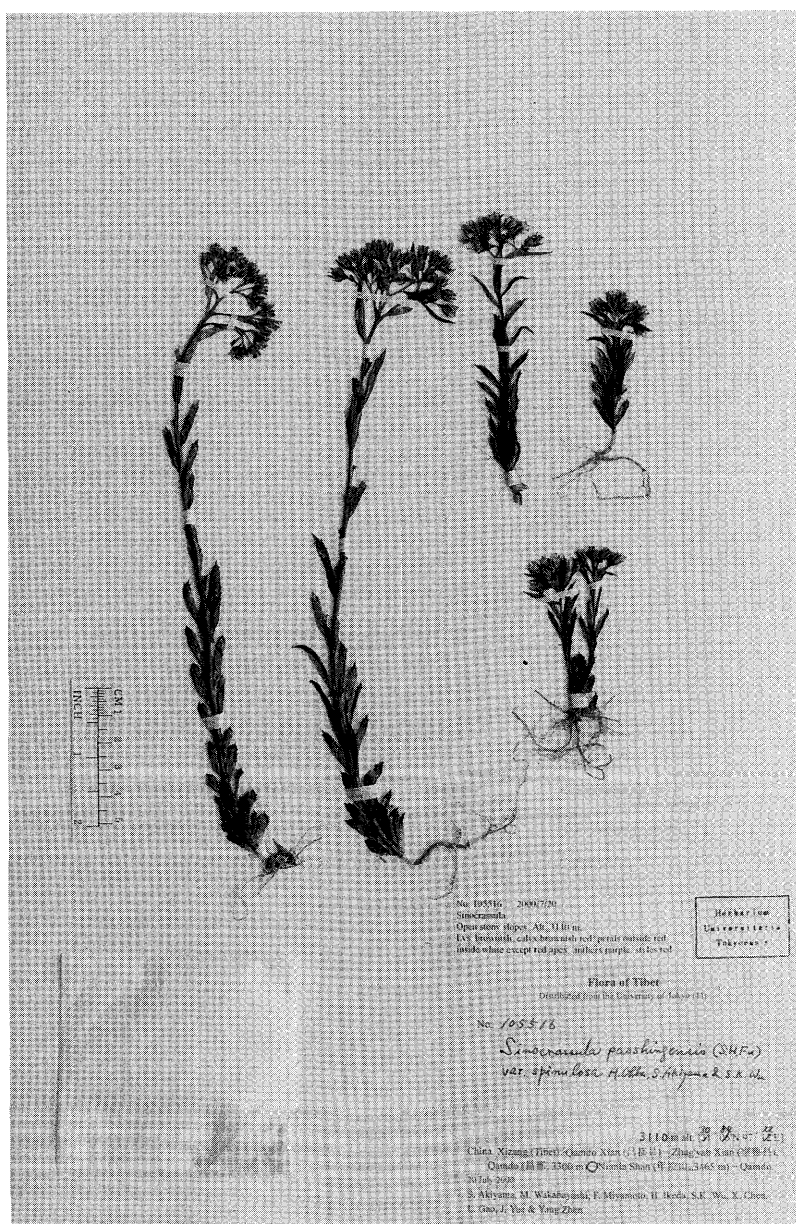


Fig. 1. *Sinocrassula paoshingensis* var. *spinulosa* H.Ohba, S.Akiyama & S.K.Wu (Akiyama et al. 105516, TI-isotype).

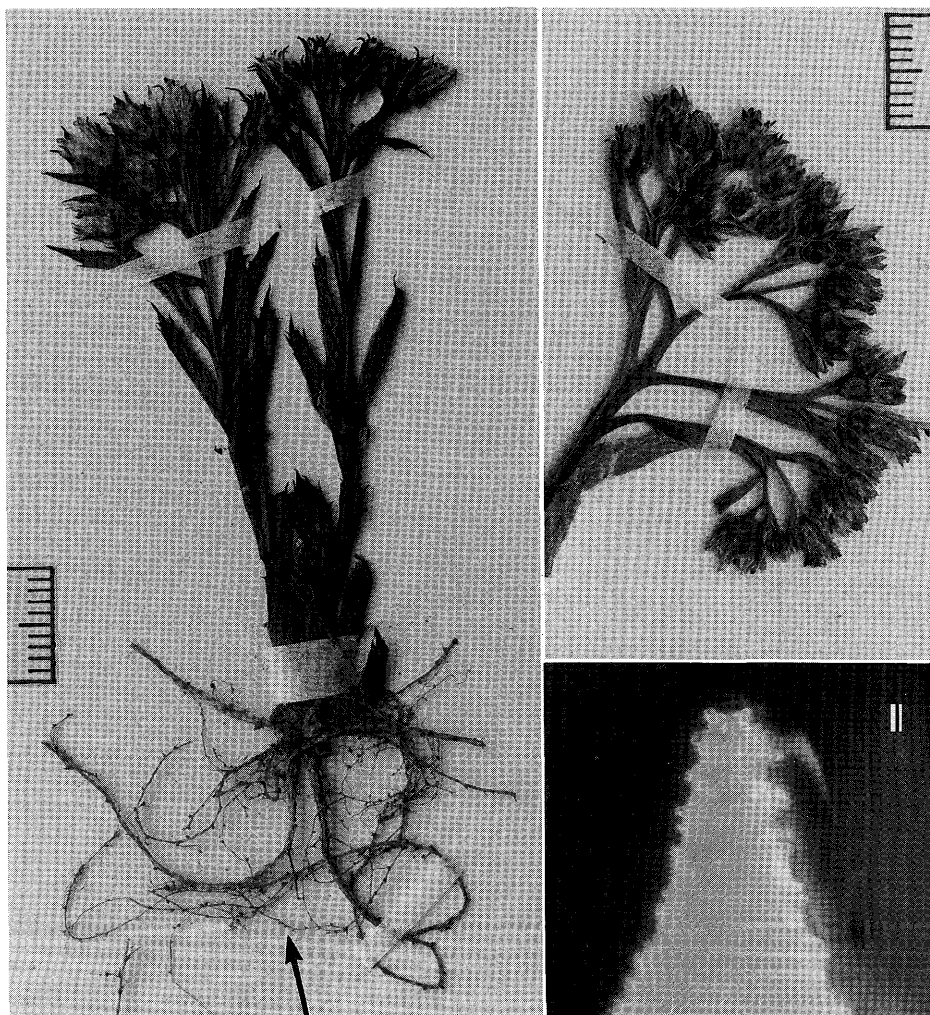


Fig. 2. *Sinocrassula paoshingensis* var. *spinulosa* H.Ohba, S.Akiyama & S.K.Wu. Left: Roots with nodule-like structures (arrow). Upper right: Inflorescence. Lower right: Apex of sepal (densely papillate) (Bar indicates 0.5 mm).

Roots with nodule-like structures (Fig. 2, left). Rosulate leaves succulent, brownish green, obovate, to 2 cm long, to 5 mm wide, apically serrate, teeth acute-spinulose, base cuneate, densely papillate. Flowering stem from center of a rosette, straight, 5–23 cm tall, terete, brownish, sparsely papillate. Cauline leaves alternate, succulent, brownish green, narrowly ovate to narrowly elliptic, 1.5–2.5 cm long, 3–6 mm wide, apically ser-

rate (teeth acute-spinulose), base cuneate, densely papillate; fallen leaves rooting at base. Inflorescences terminal, cymes with nearly flat top, 5–30-flowered, bracteate or ebracteate; bracts to 1.5 cm long, linear. Flowers in July and August, pedicellate; pedicels 1–5(–8) mm long. Calyx densely papillate; tube less than 1 mm long; lobes 5, brownish red, narrowly triangular to triangular-ovate, 3–4 mm long, apex tapering, with

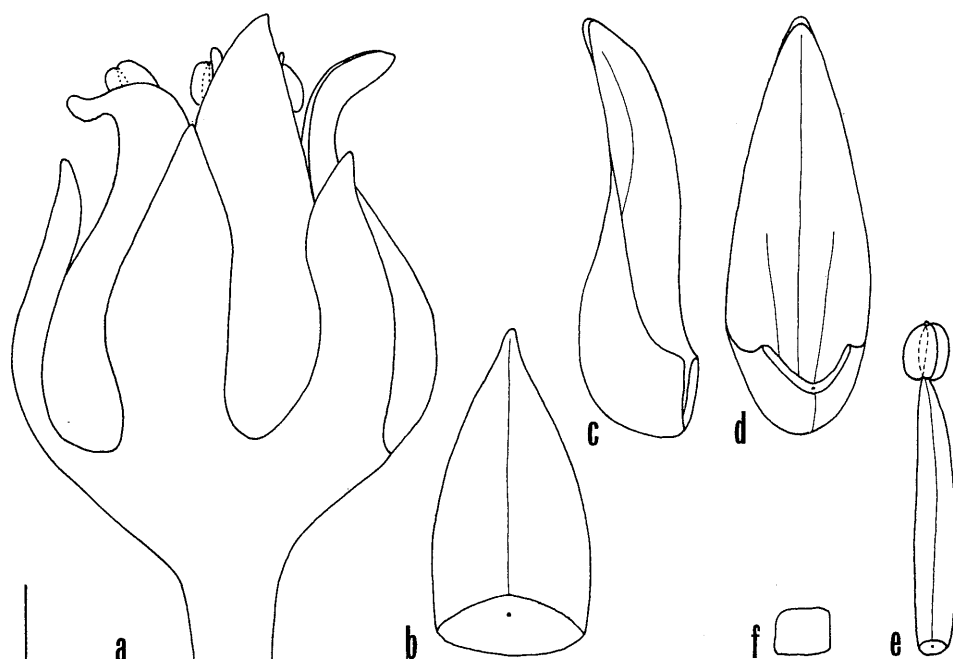


Fig. 3. *Sinocrassula paoshingensis* var. *spinulosa* H.Ohba, S.Akiyama & S.K.Wu. a: Flower. b: Sepal. c & d: Petals (c: lateral view). e: Stamen. f: Nectar scale. Bar indicates 1 mm.

obtuse tip, base 1.5–2 mm wide and spurless, minutely papillate, erect at flowering. Petals 5, outside red, inside white except red apex, linear-subulate, 5–5.5 mm long, 1.5–2 mm wide, apex obtuse (not apiculate), minutely papillate, erect throughout flowering, with reflexed apex. Stamens 5, alternipetalous, slightly shorter than petals; filaments erect, ca. 3.5 mm long; anthers basifixed, oblong, purple before dehiscence. Nectar scales 5, transversely rectangular, ca. 0.5 mm long, ca. 0.7 mm wide. Ovaries ca. 4 mm long, base slightly connate on ventral side, not swollen on dorsal side, tapering; styles indistinguishable; stigma papillate. Follicles not observed.

Specimens examined. **China. Xizang.** Qamdo Xian: Qamdo–Nianla Shan [ $30^{\circ}54'N$   $97^{\circ}22'E$ ]. On open stony slopes, 3110 m alt. (Akiyama, Wakabayashi, Miyamoto, Ikeda, Wu, Chen, Gao, Yue and Yang Zhen

105516, 20 July 2000; KUN–holotype; A, TI, TNS–isotypes).

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秋山 忍<sup>a</sup>, 大場秀章<sup>b</sup>, 武 素功<sup>c</sup>: *Sinocrassula paoshingensis* (S.H.Fu) H.Ohba & al. の新変種 var. *spinulosa* (ベンケイソウ科)

*Sinocrassula* (テンジクイワレンゲ属, ベンケイソウ科) は, 中国–ヒマラヤ地域に固有な属であり, この地域で多様化した植物群のひとつである。本属は植物体が多肉質であるため, 他のベンケイソウ科植物と同様に, おし葉標本での形態の観察が難しく, 種の形態的な変異の実態がいまだよく判っておらず, 種レベルの分類に問題が残されている。

2000年に東チベットの昌都付近で *Sinocrassula paoshingensis* に近似するが, 葉縁に先が刺状となる不規則な鋸歯を有する葉をもつ未知の植物を見出し, その生育状況及び形態について観察を行った。この葉は上記の種のように容易には脱落しない。しかし, 花部器官の形態は, 花卉の先端が微突出しない点を除き, *S. paoshingensis* から大きく

異なる点がない。

なお, ベンケイソウ科においては, 葉の有毛性, 鋸歯性, 先端の刺状性は, 安定しており, 出現の仕方も一定しているため, 分類形質として重視されている。ただ, *Sinocrassula* の葉は無刺状端で全縁であるとされているが, 例外として四川省 (康定 Tatsienlu [Kangding] と成都 Chengdu の間) での採集標本にもとづいて記載された *Sinocrassula indica* var. *serrata* が鋸歯縁をもつ。これは葉が有毛である点で今回採集した植物とは明らかに異なる。こうした刺状性葉の存在は, *Sinocrassula* においてもイワレンゲ属 (*Orostachys*) のように刺状性での多様化が起きている可能性を示唆する。

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